IN THE CLAIMS:

1. (Previously Presented) An optical scanning probe system (111), comprising:

a mounting component (119, 122) for detachably mounting at least one of a plurality of types of optical scanning probes (112A, 112B) having scanning components (16a, 16c, 16b) for scanning an examination site with the focal point of observation light emitted by a light source device (113);

a recognition component (131) for recognizing the type of optical scanning probe mounted to the mounting component (119); and

a control device (130) for controlling the scanning components (16a, 16c, 16b) in the optical scanning probe according to the type of the optical scanning probe recognized by the recognition component (131).

2. (Original) An optical scanning probe device in which an examination site is scanned with the focal point of observation light emitted by a light source device (113), and the observation light reflected from the examination site as a result of the scanning is transmitted to observation devices (113, 114, 115), comprising:

a transmission member (6b) for transmitting the observation light emitted by the light source device (113) and emitting said observation light from an end face, and receiving at this end face the observation light reflected from the examination site and transmitting same to the observation devices (113, 114, 115);

a condensing optical system (18) for condensing the observation light emitted from the end face of the transmission member (6b);

a fixing member (17) for fixing the condensing optical system (18) along with the end face of the transmission member (6b); and

scanning components (16a, 16c, 16b) for moving the fixing member (17) and scanning the examination site with the focal point of the observation light.

3. (Original) An optical scanning probe device according to Claim 2, wherein the scanning components (16a, 16c, 16b) comprise:

first movement devices (16a, 16c) for moving the fixing member (17) in a specific first direction; and

a second movement device (16b) for moving the fixing member in a second direction that differs from the first direction.

4. (Original) An optical scanning probe device in which an examination site is scanned with the focal point of observation light emitted by a light source device (113), and the observation light reflected from the examination site as a result of the scanning is transmitted to observation devices (113, 114, 115), comprising:

a transmission member (6b) for transmitting the observation light emitted by the light source device (113) and emitting said observation light from an end face, and receiving at this end face the observation light reflected from the examination site and transmitting same to the observation devices; and

a condensing optical system (18) for condensing the observation light emitted from the end face of the transmission member (6b),

wherein the relative positions of the condensing optical system (18) and the end face of the transmission member (6b) are maintained during scanning.

5. (Original) An optical scanning probe system, comprising:

a light source device (113) for emitting observation light;

an optical fiber (6b) for transmitting the observation light;

a photocoupler (125) for guiding the observation light to the emitting terminal side of the optical fiber (6b) and guiding the return light coming in from the base side of the optical fiber (6b) to a photodetector side;

a photodetector (124) for detecting the return light and subjecting it to photo-electric conversion;

an optical scanning probe (112A) having scanners (16a, 16c, 16b) for integrally scanning an object lens (18) and the tip of the optical fiber (6b) positioned facing each other at the emitting terminal of the optical fiber (6b), and scanning the focal position in a confocal relationship with the emitting terminal of the optical fiber (6b);

an imaging device (115) for performing signal processing that images the output signal of the photodetector (124);

scanner drivers (148, 149) for driving the scanners (16a, 16c, 16b); and

a display device (116) for displaying the output signal of the imaging device (115).

6. (Original) An optical scanning probe device, wherein at least the emitting terminal of an optical fiber (6b) and an object lens (203) are integrally fixed, and a reflection member (202) is provided so that the emitted light is reflected laterally and the return light thereof is detected.

7. (Original) An optical scanning probe device structured such that at least the emitting terminal of an optical fiber (6b) and object lenses (18, 241) are integrally fixed, and

tip cover glasses (225, 234) of the optical scanning probe doing the scanning have an angle that is not perpendicular to the optical axis.

8. (Original) An optical scanning probe device, wherein a tip cover glass (234) of an optical scanning probe has an angle that is not perpendicular to the axis of the optical scanning probe, and two-dimensional scanners (239a, 239c, 239d) are structured such that their optical axes are perpendicular to this cover glass (234).

9. (Original) An optical scanning probe device comprising a probe (8) inserted into a body cavity, light sources (123, 2) for irradiating an examination site with light, an optical fiber (6b) for guiding the light from the light sources (123, 2) to the probe (8) tip, a focusing optical system (18) for focusing the light from the optical fiber (6b) onto the examination site and condensing the light from the examination site onto the end face of the optical fiber (6b), optical scanning components (16a, 16c, 16b) for scanning the examination site with the focal point focused by the focusing optical system (18), separating devices (125, 7) for separating at least a portion of the return light coming from the examination site from the optical path of the light coming from the light sources (123, 2), and photodetectors (124, 34) for detecting the separated light,

wherein the scanning components (16a, 16c, 16b) integrally scan the condensing optical system (18) and the optical fiber (6b) tip in a probe tip (9).

10. (Original) The optical scanning probe device according to Claim 9, wherein the scanning components (16a, 16c, 16b) scan the focal point in at least two directions.

11. (Original) The optical scanning probe device according to Claim 9, wherein the scanning components (55a, 55b, 55c) have two differently orientated scanning components which are connected serially.

12. (Original) The optical scanning probe device according to Claim 9, wherein at least one (16b) of the scanning components (16a, 16c, 16b) is driven at a resonant frequency.

13. (Original) The optical scanning probe device according to Claim 9, wherein the scanning components (16a, 16c, 16b) have at least one deformation component (15a, 15c, 15b) of low rigidity.

14. (Original) The optical scanning probe device according to Claim 13, wherein the deformation components have parallel plate structures (15a, 15c, 15b, 15d).

15. (Original) The optical scanning probe device according to Claim 13, wherein the deformation components are structured as linear members (96a, 96b, 96c, 96d).

16. (Original) The optical scanning probe device according to Claim 9, wherein the probe tip (9) has a sealed construction.

17. (Original) The optical scanning probe device according to Claim 9, wherein the scanning components (16a, 16c, 16b) are scanned within the sealed portion, and the exterior part of the probe tip does not move.

18. (Original) The optical scanning probe device according to Claim 9, wherein the probe (8) has a base (14) for fixing the scanning components (15a, 15c, 15b).

19. (Original) The optical scanning probe device according to Claim 18, wherein the base (14) is heavier than the lens (18) to be scanned.

20. (Original) The optical scanning probe device according to Claim 18, wherein a portion of the optical fiber (6b) is fixed to the base (14).

21. (Original) The optical scanning probe device according to Claim 9, wherein impact cushioning devices (81a, 81c) are provided in the stroke ends of the scanning range of the scanning components (76a, 76c, 76b).

22. (Original) The optical scanning probe device according to Claim 9, provided with a device (45) for fixing the area close to the probe tip (9) to an endoscope.

23. (Original) The optical scanning probe device according to Claim 9, wherein the scanning components (76a, 76c, 76b) have a member (73) for moving the focal point in the axial direction of the probe.

24. (Original) The optical scanning probe device according to Claim 9, wherein the optical fiber is a single-mode fiber (6b).

25. (Original) The optical scanning probe device according to Claim 9, wherein the optical fiber is a multi-mode fiber.

26. (Original) The optical scanning probe device according to Claim 9, wherein the optical fiber is a polarization plane-preserving fiber (90b).

27. (Original) An optical scanning probe device in which observation light emitted by a light source device (113) is condensed by a specific lens (18), and the focal point of said observation light is scanned with respect to an examination site, comprising:

a single first deformation component (163a) deformable in a specific first direction;

a single second deformation component (163b) connected via a connecting component (163c) to one end of the first deformation component (163a) and deformable in a second direction that is perpendicular to the first direction;

a fixing component connected to the other end of the first deformation component (163a) with respect to the end with the connecting component (163c), for fixing the first deformation component (163a) to a probe unit (165) side;

a condenser fixing component (168a) formed on the other end of the second deformation component (163b) with respect to the end with the connecting component (163c), for fixing a condenser (166) that condenses observation light emitted by the light source device (113) to the second deformation component (163b);

a first drive device (164a) provided in the first deformation component (163a) and able to drive in the first direction; and

a second drive device (164b) provided to the second deformation component (163b) and able to drive in the second direction.

28. (Original) An optical probe device, in which an examination site is scanned with the focal point of observation light emitted by a light source device (113),

wherein a first deformation component (163a) and a second deformation component (163b) are formed by forming a cut-out groove (163d) of a specific width in an

elastic plate that is elastically deformable within a specific range, while leaving a portion uncut to form a connecting component (163c), the connecting component (163c) is bent such that the deformation direction of the first deformation component (163a) is perpendicular to the deformation direction of the second deformation component (163b),

the other end of the first deformation component (163a) with respect to the end with the connecting component (163c) is fixed on the probe unit (165) side, and

a condenser (166) that condenses the observation light emitted by the light source device (113) is disposed on the other end of the second deformation component (163b) with respect to the end with the connecting component (163c).

29. (Currently Amended) An optical scanning probe device having a two-dimensional scanner for two-dimensionally scanning ~~just~~ an optical fiber (6b),

wherein the two-dimensional scanner is operatively connected to the optical fiber and has ~~two sets~~ a first set of parallel plate structures (16a, 16c[[;]] ~~16b, 16d~~) for scanning in a first direction and a second set of parallel plate structures (16b, 16d) for scanning in a second direction.

30. (Currently Amended) An optical scanning probe device, having a two-dimensional scanner with which at least the emitting terminal of an optical fiber (6b) and an object lens (203) are integrally fixed and integrally subjected to two-dimensional scanning,

wherein the two-dimensional scanner is operatively connected to the optical fiber and has ~~two sets~~ a first set of parallel plate structures (16a, 16c[[;]] ~~16b, 16d~~) for scanning in a first direction and a second set of parallel plate structures (16b, 16d) for scanning in a second direction.

31. (Currently Amended) The optical scanning probe device according to Claim 29, wherein the ~~two-dimensional scanner has two~~ first and second sets of parallel plate structures (16a, 16c; 16b, 16d) ~~which~~ are each linked by an intermediate member (311).

32. (Currently Amended) The optical scanning probe device according to Claim 30, wherein the ~~two-dimensional scanner has two~~ first and second sets of parallel plate structures (16a, 16c; 16b, 16d) ~~which~~ are each linked by an intermediate member (311).

33. (Original) An optical scanning probe device having a two-dimensional scanner with which just an optical fiber (437) is two-dimensionally scanned, or at least the emitting terminal of the optical fiber (437) and an object lens (435) are integrally fixed and integrally subjected to two-dimensional scanning,

wherein the two-dimensional scanner comprises two plate-form actuators (433, 440) each scanning in a different direction and an intermediate member (434), the tip end side of the plate-form actuator (433) fixed on the proximal side of the two-dimensional scanner is fastened on the tip end of the intermediate member (434), and the proximal side of the plate-form actuator (440) disposed on the tip end side of the two-dimensional scanner is fastened on the proximal side of the intermediate member (434).

34. (Original) The optical scanning probe device according to Claim 33, wherein an electrode is soldered at the portion located at the fixed part of the plate-form piezoelectric actuator (440).

35. (Original) An optical scanning probe device having a two-dimensional scanner with which just an optical fiber (437) is two-dimensionally scanned, or at least the

emitting terminal of the optical fiber (437) and an object lens (435) are integrally fixed and integrally subjected to two-dimensional scanning,

wherein the two-dimensional scanner comprises a set of parallel plate structure actuators (453a, 454a, 453b, 454b), plate-form actuators (455, 456), and an intermediate member (434), the proximal side of the plate-form actuators (455, 456) is fixed to the near fixed part (432) side of the two-dimensional scanner, the tip end side of the plate-form actuators (455, 456) is fixed to the tip end side of the intermediate member (434), the proximal side of the parallel plate structure actuators (453a, 454a, 453b, 454b) is fixed to the proximal side of the intermediate member (434), and the tip end side of the parallel plate structure actuators (453a, 454a, 453b, 454b) is fixed to the optical fiber (434), or to the optical fiber (434) and the object lens (435).

36. (Original) An optical scanning probe device having a two-dimensional scanner with which just an optical fiber (167) is two-dimensionally scanned, or at least the emitting terminal of the optical fiber (167) and an object lens (166) are integrally fixed and integrally subjected to two-dimensional scanning,

wherein the two-dimensional scanner comprises two unimorphs in which two piezoelectric elements (164a, 164b) are bonded to a single bending plate (163a, 163b) having a slit (163d), with the slit (163d) interposed in between.

37. (Original) An optical scanning probe device having a two-dimensional scanner with which just an optical fiber (167) is two-dimensionally scanned, or at least the emitting terminal of the optical fiber (167) and an object lens (166) are integrally fixed and integrally subjected to two dimensional scanning,

wherein the two-dimensional scanner comprises two bimorphs in which two piezoelectric elements (164a, 164a'; 164b, 164b') are bonded to both sides of a single bending plate (163a, 163b) having a slit (163d), with the slit (163d) interposed in between.

38. (Original) An optical scanning probe device having a two-dimensional scanner with which just an optical fiber (167) is two-dimensionally scanned, or at least the emitting terminal of the optical fiber (167) and an object lens (166) are integrally fixed and integrally subjected to two-dimensional scanning,

wherein the two-dimensional scanner comprises two plate-form piezoelectric actuators (163a, 164a; 163b, 164b), and the lengths of the piezoelectric elements are different.

39. (Currently Amended) An optical scanning probe device having a two-dimensional scanner (415) with which the emitting terminal of an optical fiber (412), or the emitting terminal of the optical fiber (412) and an object lens are integrally subjected to two-dimensional scanning,

wherein the optical fiber (412) and ~~the~~ a fixed part (419) of the optical scanning probe are located where vibration produced by the two-dimensional scanner is not transmitted.

40. (Currently Amended) An optical scanning probe device having a two-dimensional scanner with which the emitting terminal of an optical fiber (6b), or the emitting terminal of the optical fiber (6b) and an object lens (18) are integrally subjected to two-dimensional scanning,

wherein ~~the~~ a fixed part (27) of the optical scanning probe and the optical fiber (6b) are located inside the hard tip (9) of the optical scanning probe.

41. (Currently Amended) An optical scanning probe device having a two-dimensional scanner (415) with which the emitting terminal of an optical fiber (412), or the emitting terminal of the optical fiber (412) and an object lens are integrally subjected to two-dimensional scanning,

wherein ~~the~~ a fixed part (419) of the optical scanning probe and the optical fiber (412) are located to the rear by at least the same length as the two-dimensional scanner.

42. (Currently Amended) An optical scanning probe device having a two-dimensional scanner (415) with which the emitting terminal of an optical fiber (412), or the emitting terminal of the optical fiber (412) and an object lens are integrally subjected to two-dimensional scanning,

wherein ~~the~~ a fixed part (419) of the optical scanning probe and the optical fiber (412) are located at a position corresponding to an integer multiple of the length of the two-dimensional scanner.

43. (Currently Amended) An optical scanning probe device having a two-dimensional scanner (415) with which the emitting terminal of an optical fiber (412), or the emitting terminal of the optical fiber (412) and an object lens are integrally subjected to two-dimensional scanning,

wherein slack (420) is provided to the optical fiber (412) on the tip end side from the location of ~~the~~ a fixed part (419) of the optical fiber (412).

44. (Original) An optical scanning probe device having a two-dimensional scanner with which the emitting terminal of an optical fiber (6b), or the emitting terminal of

the optical fiber (6b) and an object lens (18) are integrally subjected to two-dimensional scanning,

wherein a barrier (14b) is formed between the optical fiber (6b) and a signal line (19) that drives the two-dimensional scanner.

45. (Currently Amended) An optical scanning probe device having a two-dimensional scanner with which the emitting terminal of an optical fiber (6b), or the emitting terminal of the optical fiber (6b) and an object lens (18) are integrally subjected to two-dimensional scanning,

wherein ~~the~~ a signal line (19) that drives the two-dimensional scanner is fixed at the rear end (28) of the two-dimensional scanner.

46. (Currently Amended) An optical scanning probe device having a two-dimensional scanner with which the emitting terminal of an optical fiber (6b), or the emitting terminal of the optical fiber (6b) and an object lens (18) are integrally subjected to two-dimensional scanning,

wherein provision is made such that a signal line connected to the two-dimensional scanner does not come into contact with the optical fiber (6b) on the tip end from ~~the~~ a fixed part (28) thereof.

47. (Original) An optical scanning probe device comprising a probe (8) with a built-in scanner that is reciprocally driven, a control device (114) for driving the scanner, a light source (123) for irradiating an examination site with light, an optical fiber (6b) for guiding the light from the light source (123) to the probe tip, a focusing optical system (18) for focusing the light from the optical fiber (6b) on the examination site and condensing the

light from the examination site on the end face of the optical fiber (6b), a separating device (125) for separating at least a portion of the return light coming from the examination site from the optical path of the light coming from the light source (123), a detector (124) for detecting the separated light, and an imaging device (115) for imaging the signal from the detector (124) and displaying the image on a display device (116),

wherein the imaging device (115) has image synthesizers (140, 141, 142, 144, 150, 252, 253) for synthesizing forward path and backward path images.

48. (Original) The optical scanning probe device according to Claim 47, wherein the image synthesizers have a first frame memory (252) for storing forward path images, a second frame memory (253) for storing backward path images, and a characteristic correction device (150) for matching to the hysteresis characteristics of either the forward path or the backward path, or both.

49. (Original) The optical scanning probe device according to Claim 48, wherein the characteristic correction device (150) comprises a reference table including the deviation from the forward path, a hysteresis correction coefficient, and the deviation from the backward path, uniquely corresponding to the values of the drive voltage at which the scanner is driven.

50. (Original) An optical scanning probe device comprising a probe (8) with a built-in scanner that is reciprocally driven, a control device (114) for driving the scanner, a light source (123) for irradiating an examination site with light, an optical fiber (6b) for guiding the light from the light source (123) to the probe tip, a focusing optical system (18) for focusing the light from the optical fiber (6b) on the examination site and condensing the

light from the examination site on the end face of the optical fiber (6b), a separating device (125) for separating at least a portion of the return light coming from the examination site from the optical path of the light coming from the light source (123), a detector (124) for detecting the separated light, and an imaging device (115) for imaging the signal from the detector (124) and displaying the image on a display device (116),

wherein the scanner has a scanning position correction device (302) for making the forward and backward path scanning positions coincide with the scanning position of either the forward path or the backward path.

51. (Original) The optical scanning probe device according to Claim 50, wherein the imaging device (115) has a drive signal correction circuit (309) for receiving a signal from the position correction device (302) and correcting the drive signal that drives the scanner.

52. (Original) An optical scanning probe device comprising:

a probe (8) with a built-in scanner that is driven by a non-linear drive signal;

a control device (114) for driving the scanner;

a light source (123) for irradiating an examination site with light;

an optical fiber (6b) for guiding the light from the light source (123) to the probe tip;

a focusing optical system (18) for focusing the light from the optical fiber (6b) on the examination site and condensing the light from the examination site on the end face of the optical fiber (6b);

a separating device (125) for separating at least a portion of the return light coming from the examination site from the optical path of the light coming from the light source (123);

a detector (124) for detecting the separated light; and

an imaging device (115) for imaging the signal from the detector (124) and displaying the image on a display device (116),

wherein the imaging device (115) has a linear correction device for the linear correction of the image displayed on the display device (116), and the linear correction device is equipped with a non-linear drive signal generator for generating these non-linear drive signals, an aperiodic pulse generator for generating aperiodic pulses, and an A/D converter (140) for subjecting these aperiodic pulses to A/D conversion as sampling clock signals.

53. (Original) A confocal optical scanning probe device comprising a probe (8) having a reciprocally driven scanner, a control device (114) for driving the scanner, a light source (123) for irradiating an examination site with light, an optical fiber (6b) for guiding the light from the light source (123) to the probe tip, a focusing optical system (18) for focusing the light from the optical fiber (6b) on the examination site and condensing the light from the examination site on the end face of the optical fiber (6b), a separating device (125) for separating at least a portion of the return light coming from the examination site from the optical path of the light coming from the light source (123), a detector (124) for detecting the separated light, and an imaging device (115) for imaging the signal from the detector (124) and displaying the image on a display device (116),

wherein the imaging device (115) has a one-way direction display device for displaying only the image of the forward path or the backward path.

54. (Original) A confocal optical scanning probe device comprising:

a probe (8) with a built-in scanner that is driven by a non-linear drive signal;

a control device (114) for driving the scanner;

a light source (123) for irradiating an examination site with light;

an optical fiber (6b) for guiding the light from the light source (123) to the probe tip;

a focusing optical system (18) for focusing the light from the optical fiber (6b) on the examination site and condensing the light from the examination site on the optical fiber end face;

a separating device (125) for separating at least a portion of the return light coming from the examination site from the optical path of the light coming from the light source (123);

a detector (124) f or detecting the separated light; and

an imaging device for A/D converting and imaging the signal from the detector (124) and displaying the image on a display device,

wherein the imaging device (115) has a display timing device for displaying an image by adjusting the phase of the A/D converted sampling pulses with respect to the non-linear drive waveform, and the display timing device shifts the phase of the sampling pulses by 90° with respect to the non-linear drive waveform.

55. (Original) A confocal optical scanning probe device comprising:

a probe (8) with a built-in scanner that is driven by a non-linear drive signal;

a control device (114) for driving the scanner;

a light source (123) for irradiating an examination site with light;

an optical fiber (6b) for guiding the light from the light source (123) to the probe tip;

a focusing optical system (18) for focusing the light from the optical fiber (6b) on the examination site and condensing the light from the examination site on the optical fiber end face;

a separating device (125) for separating at least a portion of the return light coming from the examination site from the optical path of the light coming from the light source (123);

a detector (124) for detecting the separated light; and

an imaging device (115) for imaging the signal from the detector (124) and displaying the image on a display device (116),

wherein the imaging device (115) has a frame memory (141) for storing the image as line data, and a line interpolator for interpolating the line data stored in the frame memory (141),

the line interpolator has a thinning device for reading the line data from the frame memory (141) thinned to an integer fraction, and a copier for copying to a plural multiple the line data read by the imaging device, and

the number of lines of line data stored in the frame memory is the same as the number of lines of line data copied by the copier.

56. (Original) An observation method in which the force with which the tip of an optical scanning probe (112A, 112B) is pressed against an examination site is adjusted to adjust the observation depth, and the angle at which this tip is pressed is adjusted to adjust the angle of the observation plane.